

**Renewable Energy Question #27: Has Michigan, or have other jurisdictions, incentivized flexible, fast-ramping non-renewable generation as a part of or a complement to the renewable standard? Why or why not?**

While states have not incentivized flexible or fast-ramping non-renewable generation as part of or a complement to renewable energy standards, incentives for flexible, ramping generation have been and continue to be a complement to the power grid because of power supply and demand fluctuations, regardless of the presence of renewable generation. The grid has always required and provided real time increments and decrements of supply from assets that are capable of ramping. The Midwest ISO offers an enormous pool of ramping resources, and the creation of power pools has been motivated over the years in part by the benefits of pooling reserves and the flexibility they offer.

The most relevant flexible, ramping service is known as Frequency Regulation, which is also the most expensive and most difficult of the ancillary services to supply. Frequency Regulation requires the generator or load providing ramping to continuously respond to power system operator signals to move up and down. The ISOs and FERC have recently addressed the advantages of procuring Frequency Regulation from resources that respond quickly and accurately. FERC recently reviewed and reformed the incentives for all ISOs' procurement of flexible, fast ramping resources of any kind. FERC Order 755 found that pre-reform, the Frequency Regulation market paid for the capacity set aside to respond to requests for ramping, but ignored the performance. FERC found that slow response times forced ISOs to make larger procurements and to not meet performance targets. FERC issued Order 755 in October 2011 to align market incentives for fast-ramping resource so as to make rates fair and reasonable.

Amongst the fast-ramping resources providing flexible ramping services are industrial loads. For example, manufacturer ALCOA's Warrick Operations (located in Southern Indiana) is a direct participant in the Midwest ISO Energy Market for this purpose. The ability of a process company such as ALCOA to support the grid has been discussed for years, prior to any renewable energy standards. See for example this paper by Oak Ridge National Lab, here noted by Midwest ISO:

<https://www.midwestiso.org/Library/Repository/Meeting%20Material/Stakeholder/DRWG/2009/20090202/20090202%20DRWG%20ALCOA%20Public%20Final.pdf>

A July 2011 review by MISO staff provides a summary of the market's ability to provide the ramping capability associated with growing wind energy on the system. See "Ramp Capability for Load Following in the MISO Markets."

<https://www.midwestiso.org/Library/Repository/Communication%20Material/Key%20Presentations%20and%20Whitepapers/Ramp%20Capability%20for%20Load%20Following%20in%20MISO%20Markets%20White%20Paper.pdf>

The actions by FERC and the ISOs to align incentives, and the integration of industrial and smaller loads to respond to the need for flexibility are new innovations to meeting the need for flexibility on the grid. The trend in most regions in recent years has been to decrease the quantity of flexibility purchased because of such reforms, while at the same time adding renewable energy generation through renewables standards. These trends indicate that (1) there is a surplus of flexible, fast-ramping resources from which to draw on, and (2) that the system has yet to approach a penetration level of wind energy that would raise concern about the availability of flexible resources.

There are scenarios where power pool arrangements are unavailable and renewable generation with a regional power system is tightly clustered, raising the issue of the need for additional ramping capability.

However, the real-world experience of the Midwest ISO has not included a link between renewable energy standards and a need for additional ramping resources and there remains (now and in the foreseeable future) a large pool of flexible resources on which to rely.